



Millennium

Inorganic Chemicals

One Company's Perspective of CHP

Millennium Chemicals Inc.



Inorganic Chemicals

Millennium Chemicals Inc. was founded in 1996 as a result spin-off of the chemical assets of Hanson PLC.

Who Is Millennium ?



Inorganic Chemicals

**Millennium Chemicals Inc. consists of
three subsidiary companies:**

- **Millennium Inorganic Chemicals**
- **Millennium Petrochemicals**
- **Millennium Specialty Chemicals**

Millennium Inorganic Chemicals - Standing tall in the world of TiO_2



Inorganic Chemicals

- **Millennium Inorganic Chemicals is the world's second-largest producer of TiO_2 - the critical pigment in paints and coatings, plastics and paper**
- **FY 1998 sales revenues were \$1.2 billion**

Millennium Inorganic Chemicals Global Structure



Inorganic Chemicals



AMERICAS

EUROPE

ASIA/PACIFIC

Millennium - Measuring Success



Inorganic Chemicals

Millennium has chosen EVA[®] as our financial performance measurement tool. In our EVA[®] Focus,

- **Capital deployed, and**
- **Cost reduction**

are among the key drivers in measuring and improving results at all Millennium Chemicals operations.

Utilities provide a key cost and capital improvement area. Primary targets are:

- **Electricity**
- **Steam**
- **Fuel**
- **Water**
- **Compressed Air**

The Road to Success



Inorganic Chemicals

Millennium's first Combined Heat and Power Plant was installed at our Stallingborough, UK facility in 1994, while still a part of Hanson PLC.

British Gas, our original partner in the installation and operation of the facility, recently sold the facility to Eastern Generation.

A Rediscovered Opportunity



Inorganic Chemicals

After the spin-off from Hanson, the Millennium management team set about to form a new culture based on the EVA[®] concept. Our goal of finding lower cost production methods without large capital expenditures, led us back to CHP possibilities and the focus on outsourcing non-core assets and operations.

Why CHP?



Inorganic Chemicals

On site Combined Heat and Power plants have several inherent advantages for plants with certain needs. Among those, it provides:

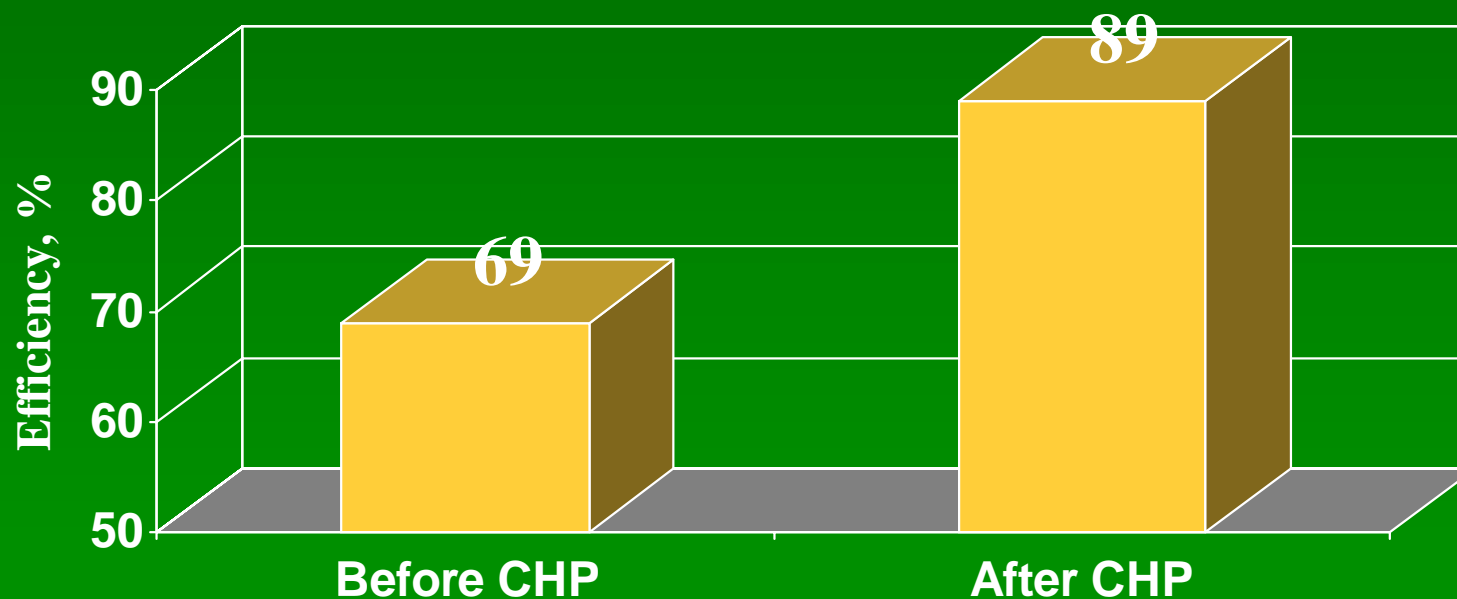
- **Higher thermal efficiencies than standard central station power plants**
- **Generates less CO₂ when steam and power are generated simultaneously**
- **No transmission costs**
- **Lower overall steam and electricity costs**

Estimated Plant Efficiency - Ashtabula



Inorganic Chemicals

Combined Electricity and Steam Generation Efficiency



Advantages for Millennium



Inorganic Chemicals

With a properly structured CHP Agreement, Millennium can:

- **Obtain reduced, predictable energy costs with rate caps**
- **Avoid unexpected maintenance and capital costs in the steam and power area**
- **Achieve higher electrical supply reliability**
- **Focus on our primary business -
Producing High Quality TiO_2**

It's Not Just Engineering



Inorganic Chemicals

Additional possible benefits:

- Millennium obtains an immediate return of capital by transferring energy assets to its CHP partner
- The CHP partner assumes operations and maintenance of selected energy assets
- The CHP partner funds construction of new CHP and other required utility assets

Potential Synergistic Benefits



Inorganic Chemicals

- Our CHP partner can potentially assume ownership, operations and maintenance responsibility for other utility services
 - we have a sharing arrangement for cost improvement of any operating efficiencies gained
- We receive immediate value for assets divested
- Our CHP partner assumes current power and fuel supply agreements
 - partner may have more leverage to negotiate better rates and pass the savings to Millennium

CHP Agreements in Place



Inorganic Chemicals

- **Stallingborough CHP Facility - Eastern Generation**
- **Baltimore CHP Facility - Trigen-Cinergy Solutions (TCS)**
- **Ashtabula CHP Facility - TCS**
- **Global CHP Agreement - TCS**
 - **Bahia, Brazil**
 - **LeHavre, France**
 - **Thann, France**

Agreements under negotiation and/or bid and design review



Inorganic Chemicals

- **Bahia, Brazil - design and economic review under Global TCS Agreement**
- **Bunbury, Western Australia - Competitive bid evaluation between TCS and Trans Alta Pty Ltd**
- **Millennium Specialty Chemicals - 2 plants in discussion with TCS**
- **French facilities review to begin in Q1 - 2000**
- **Design and contract review with Eastern Generation to match existing CHP facilities to current production configuration**

Millennium CHP configurations



Inorganic Chemicals

The projects discussed previously contemplate numerous configurations. From a single 3 to 4 MW unit, to multiple units having capacities of up to 5 to 6 MW each.

We are also considering other configurations, such as a single 40 MW unit, for plant needs, distribution to other Millennium facilities and additional sales to other local users.

Millennium Targets



Inorganic Chemicals

Millennium has targeted an 20% reduction in overall electricity and steam costs before the end of 2002

Millennium's current electricity costs



Inorganic Chemicals

Current electricity costs at our facilities around the world range from about US\$41/MWh to above US\$60/MWh. These costs depend on factors such as:

- **The local utility's cost to generate power**
- **Power transmission costs**
- **Annual consumption and peak power demand**
- **Delivery voltage and facility power factor**

Millennium's current steam costs



Inorganic Chemicals

Current steam costs are now in the range of approximately US\$10/ton to US\$18/ton, depending on the following:

- **Current boiler efficiencies**
- **Current fuel costs**
- **Operations and maintenance costs**
- **Depreciation and interest charges**

Millennium's predicted net cost reductions



Inorganic Chemicals

Millennium anticipates:

- Net electricity cost reductions to range from 25% to 40%
- Net steam cost reductions to range from 5% to 15%

The final realized savings percentages of each depend on current costs and the structure of the new agreements

Total savings at each facility



Inorganic Chemicals

The current, and/or currently anticipated, CHP electricity and steam savings at each facility under review ranges from about US\$300,000/yr. to greater than US\$3,000,000/yr.

These savings exclude any additional savings gained from the synergies of outsourcing other utility operations

Example Savings



Inorganic Chemicals

Cost - US\$/yr		Current Costs	Projected Costs
Variable Cost			
Steam exported (tons/yr)	622,868	\$5,823,298	\$5,328,158
Electricity (MWhr/yr)	196,224	\$8,431,343	\$1,995,204
Process Fuel Users (GJ/yr)	544,785	\$1,250,826	\$1,036,399
Total Variable Cost		\$15,505,467	\$8,359,760
Fixed Cost			
Labor		\$287,000	\$287,000
Labor Overhead		\$86,100	\$86,100
Maintenance		\$483,921	\$483,921
Depreciation		\$102,152	
Facilities Charge			\$5,180,760
Total Fixed Cost		\$959,173	\$6,037,781
Total Cost		\$16,464,640	\$14,397,541
Net Savings			\$2,067,099

Ongoing CHP Concerns



Inorganic Chemicals

Millennium has a concern that several things could affect the expanded use of CHP as a key initiative in controlling costs, improving reliability and fuel efficiencies. Among these concerns are:

- Implementation of 'Stranded Cost' legislation
- Implementation of fossil fuel penalties at the facility level without considering the increased overall fuel efficiency that CHP provides
- Continued lack of deregulation which would allow electricity to be freely traded and 'wheeled' from one location to another



Millennium

Inorganic Chemicals